ITEA Technology Standards

1. Characteristics & scope of technology

Pre-K-2 Targets
a. Natural world and human-made world
b. People and technology

3-5 Targets
a. Things found in nature and in the human-made world
b. Tools, materials, and skills
c. Creative thinking

6-8 Targets
a. Usefulness of technology
b. Development of technology
c. Human creativity and motivation
d. Product demand

9-12 Targets
a. Nature of technology
b. Rate of technological diffusion
c. Goal-directed research
d. Communication of technology

2. Core concepts of technology

Pre-K-2 Targets
a. Systems
b. Resources
c. Processes

3-5 Targets
a. Systems
b. Resources
c. Requirements
d. Processes

6-8 Targets
a. Systems
b. Resources
c. Requirements
d. Trade-offs
e. Processes
f. Controls

9-12 Targets
a. Systems
b. Resources
c. Requirements

d. Optimization and Trade-offs
e. Processes
f. Controls

3. Relationships among technologies and other fields

Pre-K-2 Targets
a. Connections between technology and other subjects

3-5 Targets
a. Technologies integrated
b. Relationships between technology and other fields of study

6-8 Targets
a. Interaction of systems
b. Interrelation of technological environments
c. Knowledge from other fields of study & technology

9-12 Targets
a. Technology transfer
b. Innovation and invention
c. Knowledge protection and patents
d. Technological knowledge and advances of science and math

4. Cultural, social, economic and political effects

Pre-K-2 Targets
a. Helpful or harmful

3-5 Targets
a. Good and bad effects
b. Unintended consequences

6-8 Targets
a. Attitudes toward development & use
b. Impacts and consequences
c. Ethical issues
d. Influences on economy, politics and culture

9-12 Targets
a. Rapid or gradual changes
b. Trade-offs and effects
c. Ethical implications
d. Cultural, social, economic, and political changes

5. Effects of technology on environment

Pre-K-2 Targets
a. Reuse and/or recycling of materials

3-5 Targets
a. Recycling and disposal of waste

b. Affects environment in good and bad ways

6-8 Targets
a. Management of waste
b. Technologies repair damage
c. Environmental vs. economic concerns

9-12 Targets
a. Conservation
b. Reduce resource use
c. Monitor environment
d. Alignment of natural & technological processes
e. Reduce negative consequences of technology
f. Decisions and trade-offs

6. Role of society in the development and use of technology

Pre-K-2 Targets
a. Needs and wants of individuals

3-5 Targets
a. Changing needs and wants
b. Expansion or limitation of development

6-8 Targets
a. Development driven by demands, values and interests
b. Inventions and innovation
c. Social and cultural priorities
d. Acceptance and use of products & systems

9-12 Targets
a. Different cultures and technologies
b. Development decisions
c. Factors affecting designs and demands of technology

7. Influence of Technology on History

Pre-K-2 Targets
a. Ways people have lived and worked

3-5 Targets
a. Tools for food, clothing, protection

6-8 Targets
a. Processes of inventions and innovations
b. Specialization of labor
c. Evolution of techniques, measurement, & resources
d. Technological and scientific knowledge

9-12 Targets
a. Evolutionary development
b. Dramatic changes in society

c. History of technology
d. Early technological history
e. The Iron Age
f. The Middle Age
g. The Renaissance
h. The Industrial Revolution
i. The Information Age

8. Attributes of design

Pre-K-2 Targets
a. Everyone can design
b. Design is a creative process

3-5 Targets
a. Definitions of design
b. Requirements of design

6-8 Targets
a. Design leads to useful products and systems
b. There is no perfect design
c. Requirements

9-12 Targets
a. The design process
b. Design problems are usually not clear
c. Designs need to refined
d. Requirements

9. Engineering design

Pre-K-2 Targets
a. Engineering design and process
b. Expressing design ideas to others

3-5 Targets
a. Engineering design and process
b. Creativity and considering all ideas
c. Models

6-8 Targets
a. Iterative
b. Brainstorming
c. Modeling, testing, evaluating and modifying

9-12 Targets
a. Design principles
b. Influence of personal characteristics
c. Prototypes
d. Factors in engineering design

10. Role of troubleshooting, research and development, inventions and innovation, and experimentation in problem solving

Pre-K-2 Targets
a. Asking questions and making observations
b. All products need to be maintained

3-5 Targets
a. Troubleshooting
b. Invention and innovation
c. Experimentation

6-8 Targets
a. Troubleshooting
b. Invention and innovation
c. Experimentation

9-12 Targets
a. Research and development
b. Researching technological problems
c. Not all technology problems can be solved
d. Multidisciplinary approach

11. Apply the design process

Pre-K-2 Targets
a. Solve problems through design
b. Build something

3-5 Targets
a. Collecting information
b. Visualize a solution
c. Test and evaluate solutions
d. Improve a design

6-8 Targets
a. Apply design process
b. Identify criteria and constraints
c. Model a solution to a problem
d. Test & evaluate
e. Make a product or system

9-12 Targets
a. Identify a design problem
b. Identify criteria and constraints
c. Refine the design
d. Evaluate the design
e. Develop a product or system using quality control
f. Reevaluate final solutions

12. Use and maintain technological products and systems

Pre-K-2 Targets
a. Discover how things work
b. Use tools correctly and safely
c. Recognize and use everyday symbols

3-5 Targets
a. Follow step by step instructions
b. Select and safely use tools
c. Use computers to access and organize information
d. Use common symbols

6-8 Targets
a. Use information to see how things work
b. Safely use tools to diagnose, adjust and repair
c. Use computers and calculators
d. Operate systems

9-12 Targets
a. Document and communicate processes and procedures
b. Diagnose a malfunctioning system
c. Troubleshoot and maintain systems
d. Operate and maintain systems
e. Use computers to communicate

13. Assess impact of products and systems

Pre-K-2 Targets
a. Collect information about everyday products
b. Determine the qualities of a product

3-5 Targets
a. Use information to identify patterns
b. Access the influence of technology
c. Examine trade-offs

6-8 Targets
a. Design and use instruments to collect data
b. Use collected data to find trends
c. Identify trends
d. Interpret and evaluate accuracy of information

9-12 Targets
a. Collect information and judge quality
b. synthesize data to draw conclusions
c. Employ assessment techniques
d. Design forecasting techniques

14. Medical technologies

Pre-K-2 Targets
a. Vaccinations
b. Medicine
c. Products to take care of people and their belongings

3-5 Targets
a. Vaccines and medicine
b. Development of devices to repair or replace certain parts of the body
c. Use of products and systems to inform

6-8 Targets
a. Advances and innovations in medical technologies
b. Sanitation processes
c. Immunology
d. Awareness about genetic engineering

9-12 Targets
a. Medical technologies for prevention and rehabilitation
b. Telemedicine
c. Genetic therapeutics
d. Biochemistry

15. Agricultural & related biotechnologies

Pre-K-2 Targets
a. Technologies in agriculture
b. Tools and materials for use in ecosystems

3-5 Targets
a. Artificial ecosystems
b. Agriculture wastes
c. Processes in agriculture

6-8 Targets
a. Technological advances in agriculture
b. Specialized equipment and practices
c. Biotechnology and agriculture
d. Artificial ecosystems and management
e. Development of refrigeration, freezing, dehydration, preservation and irradiation

9-12 Targets
a. Agricultural products and systems
b. Biotechnology
c. Conservation
d. Engineering design and management of ecosystems

16. Energy and Power Technologies

Pre-K-2 Targets
a. Energy comes in many forms
b. Energy should not be wasted

3-5 Targets
a. Energy comes in different forms
b. Tools, machines, products, and systems use energy to do work

6-8 Targets
a. Energy is the capacity to do work
b. Energy can be used to do work using many processes
c. Power is the rate at which energy is converted from one form to another
d. Power systems
e. Efficiency and conservation

9-12 Targets
a. Law of conservation of energy
b. Energy sources
c. Second law of thermodynamics
d. Renewable and nonrenewable forms of energy
e. Power systems are a source, a process, and a load

17. Information and communication Technologies

Pre-K-2 Targets
a. Information
b. Communication
c. Symbols

3-5 Targets
a. Processing information
b. Many sources of information
c. Communication
d. Symbols

6-8 Targets
a. Information and communication systems
b. Communication systems encode, transmit, and receive information
c. Factors influencing the design of a message
d. Language of technology

9-12 Targets
a. Parts of information and communication systems
b. Information and communications systems
c. The purpose of information and communication technology
d. Communication systems and subsystems

f. Communicating through symbols

18. Transportation Technologies

Pre-K-2 Targets
a. Transportation system
b. Individuals and goods
c. Care of transportation products and systems

3-5 Targets
a. Transportation system use
b. Transportation systems and subsystems

6-8 Targets
a. Design & operation of transportation systems
b. Subsystems of transportation system
c. Governmental regulations
d. Transportation processes

9-12 Targets
a. Relationship of transportation & other technologies
b. Intermodalism
c. Transportation of services & methods
d. Positive and negative impacts of transportation systems
e. Transportation processes and efficiency

19. Manufacturing Technologies

Pre-K-2 Targets
a. Manufacturing systems
b. Design of products

3-5 Targets
a. Natural materials
b. Manufacturing processes
c. Consumption of goods
d. Chemical technologies

6-8 Targets
a. Manufacturing systems
b. Manufacturing goods
c. Manufacturing processes
d. Chemical technologies
e. Materials use
f. Marketing products

9-12 Targets
a. Servicing obsolescence
b. Durable or non-durable goods
c. Manufacturing systems
d. Interchangeability of parts

e. Chemical technologies
f. Marketing of products

20. Construction Technologies

Pre-K-2 Targets
a. Different types of buildings
b. How parts of buildings fit

3-5 Targets
a. Modern communities
b. Structures
c. Systems used

6-8 Targets
a. Construction designs
b. Foundations
c. Purpose of structures
d. Buildings systems and subsystems

9-12 Targets
a. Infrastructure
b. Construction processes and procedures
c. Requirements
d. Maintenance, alterations, and renovation
e. Prefabricated materials